

STANDARDS DEVELOPMENT BRANCH OMSE



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DRINKING WATER SURVEILLANCE PROGRAM

**ODESSA
WATER TREATMENT
PLANT**

ANNUAL REPORT 1990

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ODESSA WATER TREATMENT PLANT
DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1990

HAZARDOUS CONTAMINANTS
COORDINATION BRANCH
135 ST. CLAIR AVENUE WEST
TORONTO, ONTARIO M4V 1P5

SEPTEMBER 1992



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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

ODESSA WATER TREATMENT PLANT 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Odessa water treatment plant is a conventional treatment plant which treats water from the Millhaven Creek. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. Granular activated carbon contactors are part of the treatment process. This plant has a rated capacity of $0.8 \times 1000 \text{ m}^3/\text{day}$. The Odessa water treatment plant serves a population of approximately 900.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Odessa water treatment plant, for the sample year 1990, produced acceptable quality water and this was maintained in the distribution system.

The treatment process does not consistently remove the colour or reduce the dissolved organic carbon levels below the ODWO aesthetic guidelines. Aluminum residuals are often elevated in the treated water. The treatment process should therefore be reviewed.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	RAW			TREATED			SITE 1		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	27	23	85	9	5	55	8	4	50
CHEMISTRY (FLD)	27	27	100	57	57	100	90	87	96
CHEMISTRY (LAB)	220	190	86	220	180	81	340	315	92
METALS	240	71	29	240	70	29	414	154	37
CHLOROAROMATICS	126	0	0	126	0	0	112	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	169	0	0	152	0	0	.	.	.
PESTICIDES & PCB	320	0	0	307	1	0	169	0	0
PHENOLICS	10	3	30	10	3	30	.	.	.
SPECIFIC PESTICIDES	59	0	0	59	0	0	8	0	0
VOLATILES	290	0	0	290	32	11	261	29	11
TOTAL	1500	314		1482	348		1402	589	

DRINKING WATER SURVEILLANCE PROGRAM

ODESSA WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Odessa water treatment plant in the spring of 1988. Previous annual reports have been published for 1988 and 1989.

PLANT DESCRIPTION

The Odessa water treatment plant is a conventional treatment plant which treats water from the Millhaven Creek. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration and disinfection. Granular activated carbon contactors are part of the treatment process. This plant has a rated capacity of $0.8 \times 1000 \text{ m}^3/\text{day}$. The Odessa water treatment plant serves a population of approximately 900.

The sample day flows ranged from $0.6 \times 1000 \text{ m}^3/\text{day}$ to $0.8 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the

plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count, which may indicate some deterioration in water quality if the guideline of 500 counts/mL is exceeded.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 2 of 8 distribution water samples with a maximum reported value of 2,400 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 8 of 17 treated and distributed water samples with a maximum reported value of 25.5°C.

CHEMISTRY (LAB)

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions.

Colour exceeded the ODWO Maximum Desirable Concentration of 5 Hazen Units (HZU) in 15 of 17 treated and distributed water samples with a maximum reported value of 14.0 HZU.

Dissolved organic carbon exceeded the ODWO Maximum Desirable Concentration of 5.0 mg/L in 11 of 17 treated and distributed water samples with a maximum reported value of 9.6 mg/L.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in all 17 treated and distributed water samples with a maximum reported value of 180.0 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The laboratory turbidity exceeded the Maximum Acceptable Concentration in 3 of 9 treated water samples with a maximum reported value of 1.6 FTU. Two of these high values were not

confirmed by the corresponding field turbidity results which are considered to be more reliable. The field turbidity was not reported for the third high laboratory turbidity result (1.32 FTU) because the plant turbidity meter was not working. A comparison of the field turbidity results indicate that the reported plant turbidity values are considerably lower than the corresponding laboratory turbidity results. This suggests that the exceedance is probably an anomalous result.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 16 of 17 treated and distributed water samples with a maximum reported value of 770.0 ug/L.

The presence of high aluminum in some treated water samples may be the reason for the high laboratory turbidity values reported. Post coagulation may have occurred between sampling and actual laboratory analysis.

ORGANIC

CHLOROAROMATICS

Hexachlorocyclopentadiene was detected at positive levels in 1 of 5 treated and distributed samples with a reported value of 100.0 ng/L. The United States Environmental Protection Agency has an Ambient Water Quality Criteria of 206,000 ng/L.

The results of the other parameters in the chloroaromatic scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenol scan showed that one parameter 2,4,6-trichlorophenol was detected at trace levels in the 2 treated water samples analyzed.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in all 17 treated and distributed water samples analyzed. The maximum observed level was 184.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Odessa water treatment plant, for the sample year 1990, produced acceptable quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

The treatment process does not consistently remove the colour or reduce the dissolved organic carbon levels below the ODWO aesthetic guidelines. Aluminum residuals are often elevated in the treated water. The treatment process should therefore be reviewed.

FIGURE 1
ODESSA WTP

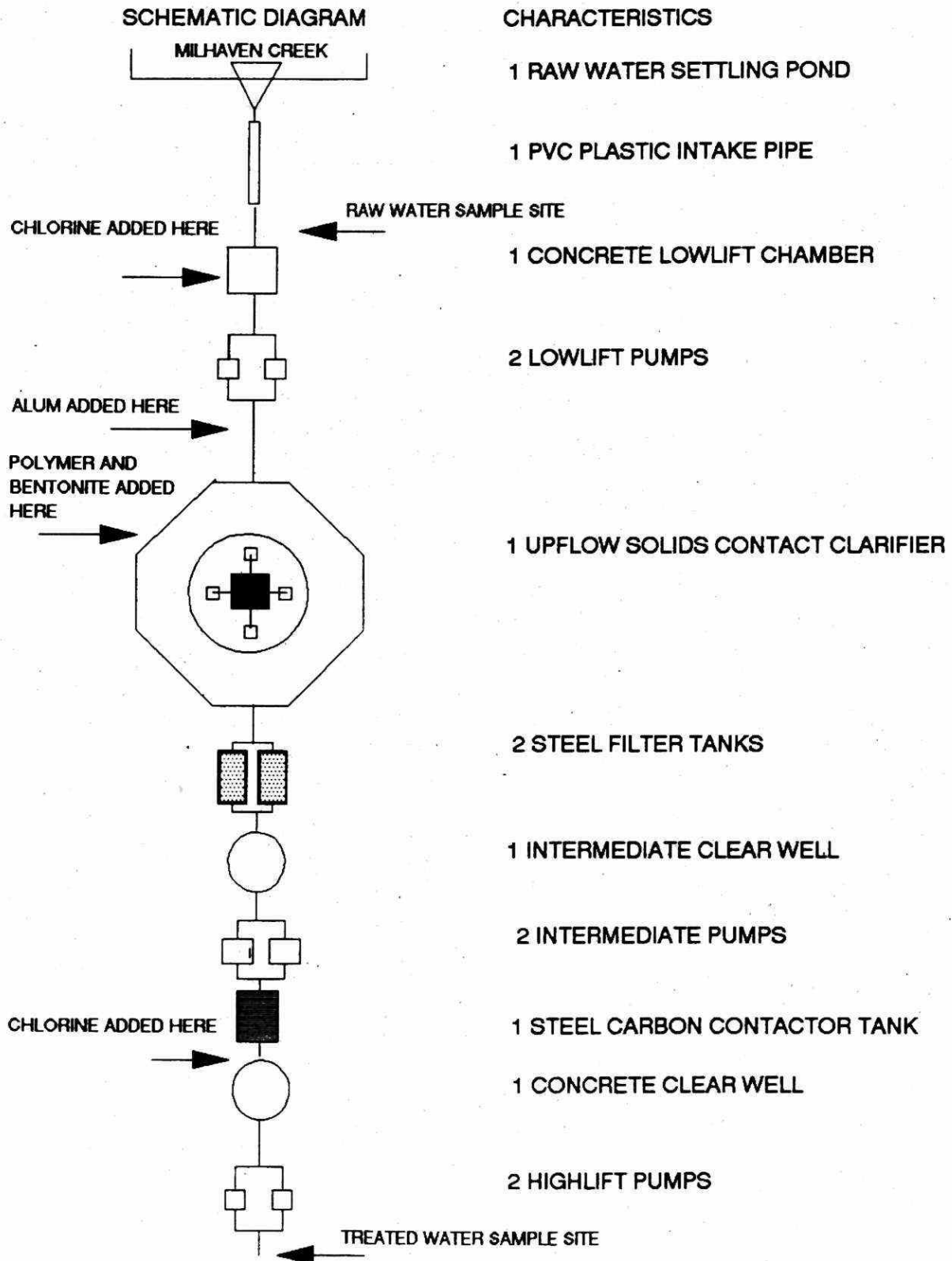


TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 210001040
PLANT NAME: ODESSA WTP

DISTRICT: KINGSTON
REGION: SOUTHEAST
DISTRICT OFFICER: J. TOOLEY

UTM #: 183624104904200

PLANT SUPERINTENDENT: JOE M. LEWIS

ADDRESS: WILTON RD, BOX 100
ODESSA, ONTARIO
KOH 2H0
(613) 386-3066

MUNICIPALITY: ERNESTOWN
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	.222	(X 1000 M3)
DESIGN CAPACITY:	2.045	(X 1000 M3/DAY)
RATED CAPACITY:	.813	(X 1000 M3/DAY)

MUNICIPALITY

ODESSA

POPULATION

925

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

<u>PARAMETER</u>	<u>LOCATION</u>	<u>FREQUENCY</u>
ALUMINUM	TREATED WATER	WEEKLY
COMBINED CHLORINE RESIDUAL	TREATED WATER	DAILY
FREE CHLORINE RESIDUAL	TREATED WATER	DAILY
TOTAL CHLORINE RESIDUAL	TREATED WATER	DAILY
PH	RAW WATER TREATED WATER	DAILY DAILY
TEMPERATURE	RAW WATER TREATED WATER	DAILY DAILY
TURBIDITY	RAW WATER TREATED WATER	DAILY DAILY

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP SAMPLE DAY CONDITIONS FOR 1990

		<u>TREATMENT CHEMICAL DOSAGE (MG/L)</u>					
		PRE CHLORINATION	COAGULATION	COAGULATION AID		POST CHLORINATION	
		CHLORINE	ALUM LIQUID	BENTONITE	POLYELECTROLYTE	CHLORINE	
DATE	DELAY * TIME(HRS) (1000M3)	FLOW					
JAN 23	3.00	.788	1.20	20.17	2.50	.15	3.00
FEB 27	2.60	.708	1.92	20.62	2.42	.12	.64
APR 04	1.75	.763	2.97	19.13	10.46	.35	1.06
APR 25	.00	.739	1.22	19.76	11.57	.19	2.46
MAY 29	5.50	.851	3.17	17.16	2.68	.19	1.60
JUN 26	2.60	.803	5.00	9.09	5.00	.20	1.70
JUL 24	3.00	.679	3.16	7.26	2.27	.99	2.67
AUG 28	2.40	.833	3.20	13.14	4.79	.04	2.17
OCT 23	2.80	.730	4.81	15.83	7.97	.34	1.24
DEC 10	2.90	.729	1.94	1.94	3.35	.17	1.24

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		

BACTERIOLOGICAL									
FECAL COLIFORM MF	9	8	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	9	5	0	8	4	0
TOTAL COLIFORM MF	9	6	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	9	9	0	.	.	.	.	.	.

*TOTAL GROUP BACTERIOLOGICAL	27	23	0	9	5	0	8	4	0

CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	10	10	0	18	15	0
FLD CHLORINE FREE	.	.	.	10	10	0	18	18	0
FLD CHLORINE (TOTAL)	.	.	.	10	10	0	18	18	0
FLD PH	10	10	0	10	10	0	18	18	0
FLD TEMPERATURE	10	10	0	10	10	0	18	18	0
FLD TURBIDITY	7	7	0	7	7	0	.	.	.

*TOTAL SCAN CHEMISTRY (FLD)	27	27	0	57	57	0	90	87	0

CHEMISTRY (LAB)									
ALKALINITY	10	10	0	10	10	0	18	18	0
CALCIUM	10	10	0	10	10	0	18	18	0
CYANIDE	10	0	1	10	0	1	.	.	.
CHLORIDE	10	10	0	10	10	0	18	18	0
COLOUR	10	10	0	10	10	0	18	18	0
CONDUCTIVITY	10	10	0	10	10	0	18	18	0
DISS ORG CARBON	10	10	0	10	10	0	18	18	0
FLUORIDE	10	10	0	10	10	0	18	18	0
HARDNESS	10	10	0	10	10	0	18	18	0
IONCAL	10	10	0	10	10	0	18	18	0
LANGELIERS INDEX	10	10	0	10	10	0	16	16	0
MAGNESIUM	10	10	0	10	10	0	18	18	0
SODIUM	10	10	0	10	10	0	18	18	0
AMMONIUM TOTAL	10	9	1	10	3	2	18	9	3
NITRITE	10	5	5	10	2	8	18	2	16
TOTAL NITRATES	10	8	2	10	10	0	18	18	0
NITROGEN TOT KJELD	10	10	0	10	10	0	18	18	0
PH	10	10	0	10	10	0	18	18	0
PHOSPHORUS FIL REACT	10	1	8	10	0	8	.	.	.
PHOSPHORUS TOTAL	10	7	3	10	5	4	.	.	.
SULPHATE	10	10	0	10	10	0	18	18	0
TURBIDITY	10	10	0	10	10	0	18	18	0

*TOTAL SCAN CHEMISTRY (LAB)	220	190	20	220	180	23	340	315	19

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		

METALS									
SILVER	10	0	0	10	0	0	18	0	0
ALUMINUM	10	10	0	10	10	0	18	18	0
ARSENIC	10	0	10	10	0	9	18	0	16
BARIUM	10	10	0	10	10	0	18	18	0
BORON	10	9	1	10	8	2	18	15	3
BERYLLIUM	10	0	1	10	0	4	18	0	5
CADMIUM	10	0	1	10	0	0	18	0	4
COBALT	10	0	9	10	0	10	18	0	15
CHROMIUM	10	1	8	10	1	6	18	1	12
COPPER	10	0	7	10	0	4	18	17	1
IRON	10	5	5	10	1	9	18	1	17
MERCURY	10	0	1	10	2	2	.	.	.
MANGANESE	10	10	0	10	10	0	18	18	0
MOLYBDENUM	10	0	8	10	0	9	18	0	15
NICKEL	10	0	3	10	0	1	18	0	7
LEAD	10	5	5	10	0	9	18	18	0
ANTIMONY	10	0	10	10	2	8	18	0	18
SELENIUM	10	0	0	10	0	3	18	0	4
STRONTIUM	10	10	0	10	10	0	18	18	0
TITANIUM	10	8	2	10	8	2	18	12	6
THALLIUM	10	0	0	10	0	0	18	0	0
URANIUM	10	0	6	10	0	7	18	0	11
VANADIUM	10	1	9	10	0	9	18	0	18
ZINC	10	2	8	10	8	2	18	18	0

*TOTAL SCAN METALS	240	71	94	240	70	96	414	154	152
*TOTAL GROUP INORGANIC & PHYSICAL	487	288	114	517	307	119	844	556	171

CHLOROAROMATICS									
HEXACHLOROBUTADIENE	9	0	0	9	0	0	8	0	0
123 TRICHLOROBENZENE	9	0	0	9	0	0	8	0	0
1234 T-CHLOROBENZENE	9	0	0	9	0	0	8	0	0
1235 T-CHLOROBENZENE	9	0	0	9	0	0	8	0	0
124 TRICHLOROBENZENE	9	0	0	9	0	0	8	0	0
1245 T-CHLOROBENZENE	9	0	0	9	0	0	8	0	0
135 TRICHLOROBENZENE	9	0	0	9	0	0	8	0	0
HCB	9	0	0	9	0	0	8	0	0
HEXACHLOROETHANE	9	0	0	9	0	0	8	0	0
OCTACHLOROSTYRENE	9	0	0	9	0	0	8	0	0
PENTACHLOROBENZENE	9	0	0	9	0	0	8	0	0
236 TRICHLOROTOLUENE	9	0	0	9	0	0	8	0	0
245 TRICHLOROTOLUENE	9	0	0	9	0	0	8	0	0
26A TRICHLOROTOLUENE	9	0	0	9	0	0	8	0	0

*TOTAL SCAN CHLOROAROMATICS	126	0	0	126	0	0	112	0	0

CHLOROPHENOLS									

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	2	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	2	0	0	0
PAH									
PHENANTHRENE	10	0	0	9	0	0	.	.	.
ANTHRACENE	9	0	0	8	0	0	.	.	.
FLUORANTHENE	10	0	0	9	0	0	.	.	.
PYRENE	10	0	0	9	0	0	.	.	.
BENZO(A)ANTHRACENE	10	0	0	9	0	0	.	.	.
CHRYSENE	10	0	0	9	0	0	.	.	.
DIMETH. BENZ(A)ANTHR	10	0	0	9	0	0	.	.	.
BENZO(E) PYRENE	10	0	0	9	0	0	.	.	.
BENZO(B) FLUORANTHEN	10	0	0	9	0	0	.	.	.
PERYLENE	10	0	0	9	0	0	.	.	.
BENZO(K) FLUORANTHEN	10	0	0	9	0	0	.	.	.
BENZO(A) PYRENE	10	0	0	9	0	0	.	.	.
BENZO(G,H,I) PERYLEN	10	0	0	9	0	0	.	.	.
DIBENZO(A,H) ANTHRAC	10	0	0	9	0	0	.	.	.
INDENO(1,2,3-C,D) PY	10	0	0	9	0	0	.	.	.
BENZO(B) CHRYSENE	10	0	0	9	0	0	.	.	.
CORONENE	10	0	0	9	0	0	.	.	.
*TOTAL SCAN PAH	169	0	0	152	0	0	0	0	0
PESTICIDES & PCB									
ALDRIN	9	0	0	9	0	0	8	0	0
ALPHA BHC	9	0	2	9	0	0	8	0	1
BETA BHC	9	0	0	9	0	0	8	0	0
LINDANE	9	0	0	9	0	0	8	0	0
ALPHA CHLORDANE	9	0	0	9	0	0	8	0	0
GAMMA CHLORDANE	9	0	0	9	0	0	8	0	0
DIELDRIN	9	0	0	9	0	0	8	0	0
METHOXYCHLOR	9	0	0	9	0	0	8	0	0
ENDOSULFAN I	9	0	0	9	0	0	8	0	0
ENDOSULFAN II	9	0	0	9	0	0	8	0	0
ENDRIN	9	0	0	9	0	0	8	0	0
ENDOSULFAN SULPHATE	9	0	0	9	0	0	8	0	0
HEPTACHLOR EPOXIDE	9	0	0	9	0	0	8	0	0
HEPTACHLOR	9	0	0	9	0	0	8	0	0
MIREX	9	0	0	9	0	0	8	0	0
OXYCHLORDANE	9	0	0	9	0	0	8	0	0
OPDDT	9	0	0	9	0	0	8	0	0
PCB	9	0	0	9	0	0	8	0	0
DDD	9	0	0	9	0	0	8	0	0
PPDDE	9	0	0	9	0	0	8	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	9	0	0	9	0	0	8	0	0
AMETRINE	10	0	0	9	0	0	.	.	.
ATRAZINE	10	0	1	9	0	0	.	.	.
ATRATONE	10	0	0	9	0	0	.	.	.
CYANAZINE (BLADEx)	10	0	0	9	0	0	.	.	.
DESETHYLATRAZINE	10	0	0	9	0	0	.	.	.
D-ETHYL SIMAZINE	9	0	0	8	0	0	.	.	.
PROMETONE	10	0	0	9	0	0	.	.	.
PROPAZINE	10	0	0	9	0	0	.	.	.
PROMETRYNE	10	0	0	9	0	0	.	.	.
METRIBUZIN (SENCOR)	10	0	0	9	0	0	.	.	.
SIMAZINE	10	0	0	9	0	0	.	.	.
ALACHLOR (LASSO)	10	0	0	9	0	0	.	.	.
METOLACHLOR	10	0	0	9	0	0	.	.	.
HEXACLCYCLOPENTADIEN	2	0	0	2	1	0	1	0	1
*TOTAL SCAN PESTICIDES & PCB	320	0	3	307	1	0	169	0	2

PHENOLICS									
PHENOLICS	10	3	3	10	3	4	.	.	.
*TOTAL SCAN PHENOLICS	10	3	3	10	3	4	0	0	0

SPECIFIC PESTICIDES									
TOXAPHENE	9	0	0	9	0	0	8	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	1	0	0	1	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.
ETHION	2	0	0	2	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.
PHORATE	2	0	0	2	0	0	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.
CICP	2	0	0	2	0	0	.	.	.
DIALATE	2	0	0	2	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		
EPTAM	2	0	0	2	0	0	.	.	.
IPC	2	0	0	2	0	0	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES									
	59	0	0	59	0	0	8	0	0

VOLATILES									
BENZENE	10	0	0	10	0	0	9	0	2
TOLUENE	10	0	0	10	0	0	9	0	0
ETHYLBENZENE	10	0	2	10	0	5	9	0	3
P-XYLENE	10	0	0	10	0	0	9	0	0
M-XYLENE	10	0	0	10	0	0	9	0	0
O-XYLENE	10	0	0	10	0	0	9	0	0
STYRENE	10	0	2	10	0	7	9	0	5
1,1 DICHLOROETHYLENE	10	0	0	10	0	0	9	0	0
METHYLENE CHLORIDE	10	0	0	10	0	0	9	0	0
1,1,2 DICHLOROETHYLENE	10	0	0	10	0	0	9	0	0
1,1 DICHLOROETHANE	10	0	0	10	0	0	9	0	0
CHLOROFORM	10	0	3	10	10	0	9	9	0
111, TRICHLOROETHANE	10	0	0	10	0	0	9	0	0
1,2 DICHLOROETHANE	10	0	0	10	0	0	9	0	0
CARBON TETRACHLORIDE	10	0	0	10	0	0	9	0	0
1,2 DICHLOROPROPANE	10	0	0	10	0	0	9	0	0
TRICHLOROETHYLENE	10	0	0	10	0	0	9	0	0
DICHLOROBROMOMETHANE	10	0	0	10	10	0	9	9	0
112 TRICHLOROETHANE	10	0	0	10	0	0	9	0	0
CHLORODIBROMOMETHANE	10	0	0	10	2	8	9	2	7
T-CHLOROETHYLENE	10	0	0	10	0	0	9	0	2
BROMOFORM	10	0	0	10	0	0	9	0	0
1122 T-CHLOROETHANE	10	0	0	10	0	0	9	0	0
CHLOROBENZENE	10	0	0	10	0	0	9	0	0
1,4 DICHLOROBENZENE	10	0	0	10	0	0	9	0	0
1,3 DICHLOROBENZENE	10	0	0	10	0	0	9	0	0
1,2 DICHLOROBENZENE	10	0	0	10	0	0	9	0	0
ETHYLENE DIBROMIDE	10	0	0	10	0	0	9	0	0
TOTL TRIHALOMETHANES	10	0	0	10	10	0	9	9	0
*TOTAL SCAN VOLATILES									
	290	0	7	290	32	20	261	29	19
*TOTAL GROUP ORGANIC									
	986	3	13	956	36	26	550	29	21

KEY TO TABLE 5 and 6

- A. ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline
- B. HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C. WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D. US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F. EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G. CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I. NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A. NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!OU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

BACTERIOLOGICAL		DET'N LIMIT = 0		GUIDELINE = 0 (A1)
FECAL COLIFORM MF (CT/100ML)				
JAN	2	.	.	.
FEB	BDL	.	.	.
APR	2	.	.	.
MAY	14	.	.	.
JUL	30	.	.	.
AUG	16	.	.	.
OCT	10	.	.	.
DEC	14	.	.	.
STANDRD PLATE CNT MF (COUNT/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)
JAN	.	23	.	12
FEB	.	5 <=>	.	1 <=>
APR	.	5 <=>	.	9 <=>
MAY	.	57	.	11
JUL	.	23	.	2400 >
AUG	.	0 <=>	.	2400 >
OCT	.	4 <=>	.	6 <=>
DEC	.	27	.	.
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)
JAN	1700	.	.	.
FEB	380	.	.	.
APR	260	.	.	.
MAY	100 <=>	.	.	.
JUL	120 <=>	.	.	.
AUG	100 <=>	.	.	.
OCT	240	.	.	.
DEC	1500	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A
JAN	36000	.	.	.
FEB	11800	.	.	.
APR	48000 >	.	.	.
MAY	40000 >	.	.	.
JUL	34000	.	.	.
AUG	42000	.	.	.
OCT	30000	.	.	.
DEC	21000	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	

CHEMISTRY (FLD)					
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.400	.200	.200	
FEB	.	.200	.200	.200	
APR	.	.300	.400	.200	
MAY	.	.400	.200	.200	
JUN	.	.200	.200	.200	
JUL	.	.300	.000	.000	
AUG	.	.300	.200	.200	
OCT	.	.200	.200	.200	
DEC	.	.300	.	.	

FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.500	.300	.300	
FEB	.	.600	.500	.500	
APR	.	.500	.300	.500	
MAY	.	.400	.100	.100	
JUN	.	.200	.100	.100	
JUL	.	.450	.100	.100	
AUG	.	.250	.100	.100	
OCT	.	.800	.100	.100	
DEC	.	.900	.	.	

FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0		GUIDELINE = N/A	
JAN	.	.900	.500	.500	
FEB	.	.800	.700	.700	
APR	.	.800	.700	.700	
MAY	.	.800	.300	.300	
JUN	.	.400	.300	.300	
JUL	.	.750	.100	.100	
AUG	.	.550	.300	.300	
OCT	.	1.000	.300	.300	
DEC	.	1.200	.	.	

FLD PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
JAN	7.200	7.000	7.200	7.000	
FEB	7.100	7.200	7.200	7.200	
APR	7.500	7.250	7.400	7.400	
MAY	7.400	7.300	7.400	7.400	
JUN	7.500	7.300	7.400	7.400	
JUL	7.500	7.300	7.400	7.400	
AUG	7.500	7.500	7.400	7.400	
OCT	7.500	7.100	7.200	7.200	
DEC	7.300	7.300	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1	
			STANDING	FREE FLOW
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
JAN	1.000	1.000	5.500	4.000
FEB	1.500	1.500	14.000	8.000
APR	9.000	11.500	11.000	11.000
MAY	18.000	20.000	18.000	16.000
JUN	20.000	21.500	18.000	18.000
JUL	22.000	23.500	21.000	20.000
AUG	24.000	25.500	22.000	22.000
OCT	12.000	11.000	14.000	12.000
DEC	4.500	3.500	.	.
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
JAN	.980	.390	.	.
FEB	.240	.480	.	.
APR	.790	.530	.	.
MAY	.850	.910	.	.
OCT	.550	.480	.	.
DEC	.770	.480	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CHEMISTRY (LAB)				
ALKALINITY (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 30-500 (A3)
JAN	155.700	145.800	141.700	141.800
FEB	158.100	139.500	144.700	142.100
APR	153.900	142.300	141.800	140.700
MAY	152.000	145.400	140.300	139.300
JUN	135.000	127.500	119.900	118.500
JUL	114.200	108.600	109.000	108.700
AUG	99.700	93.500	85.400	85.100
OCT	122.000	106.600	106.100	107.900
DEC	159.600	155.700	.	.
CALCIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 100 (F2)
JAN	56.900	57.600	56.500	56.500
FEB	54.600	52.600	54.600	53.600
APR	54.200	54.600	54.000	54.600
MAY	51.000	53.100	52.800	50.400
JUN	43.000	45.200	42.800	43.000
JUL	37.400	39.200	39.500	40.000
AUG	29.700	31.700	29.500	29.300
OCT	39.300	41.200	40.400	41.000
DEC	56.200	56.600	.	.
CYANIDE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = .2 (A1)
JAN	.002 <T	.002 <T	.	.
FEB	BDL	BDL	.	.
APR	BDL	BDL	.	.
MAY	BDL	BDL	.	.
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
AUG	BDL	BDL	.	.
OCT	BDL	BDL	.	.
DEC	BDL	BDL	.	.
CHLORIDE (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 250 (A3)
JAN	17.700	21.300	21.600	20.900
FEB	16.400	18.500	18.900	18.800
APR	16.200	19.200	19.800	18.900
MAY	18.700	23.000	25.500	21.700
JUN	16.400	21.500	22.600	22.800
JUL	14.300	20.600	20.000	20.000
AUG	15.600	20.900	21.000	20.900
OCT	18.400	22.900	24.300	22.900
DEC	18.100	20.800	.	.
COLOUR (HZU)		DET'N LIMIT = 0.5		GUIDELINE = 5 (A3)
JAN	19.000	7.000	7.000	8.000
FEB	14.500	4.500	5.000	4.500
APR	19.500	8.000	6.500	6.000
MAY	28.500	13.000	14.000	14.000
JUN	28.000	13.500	14.500	13.000
JUL	28.000	13.500	14.500	13.500
AUG	24.500	11.500	14.500	13.500
OCT	26.500	10.000	11.000	12.000
DEC	21.000	12.500	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CONDUCTIVITY (UMHO/CM)		DET'N LIMIT = 1.		GUIDELINE = 400 (F2)
JAN	377	387	384	379
FEB	375	374	387	381
APR	360	367	374	371
MAY	361	377	383	367
JUN	315	332	323	322
JUL	281	301	301	299
AUG	258	278	265	264
OCT	318	328	332	329
DEC	387	392	.	.
DISS ORG CARBON (MG/L)		DET'N LIMIT = .100		GUIDELINE = 5.0 (A3)
JAN	5.100	4.100	4.300	4.100
FEB	4.200	3.200	3.500	3.200
APR	5.100	4.400	4.500	4.400
MAY	7.300	6.700	6.600	6.700
JUN	8.800	7.400	7.700	7.700
JUL	9.600	8.800	8.900	8.500
AUG	10.300	9.000	10.000	9.600
OCT	8.500	6.900	7.200	7.200
DEC	5.400	5.200	.	.
FLUORIDE (MG/L)		DET'N LIMIT = 0.01		GUIDELINE = 2.4 (A1)
JAN	.060	.060	.060	.060
FEB	.080	.060	.060	.060
APR	.080	.120	.080	.080
MAY	.080	.080	.080	.080
JUN	.060	.060	.060	.080
JUL	.080	.060	.060	.060
AUG	.080	.080	.080	.080
OCT	.080	.060	.060	.060
DEC	.080	.080	.	.
HARDNESS (MG/L)		DET'N LIMIT = 0.5		GUIDELINE = 80-100 (A4)
JAN	176.000	180.000	175.000	176.000
FEB	177.000	171.000	177.000	174.000
APR	174.000	175.000	173.000	174.000
MAY	165.300	170.300	168.700	163.000
JUN	149.000	155.000	148.000	149.000
JUL	135.700	142.200	142.900	144.300
AUG	117.000	123.200	115.400	114.600
OCT	140.700	144.800	143.000	144.400
DEC	177.000	179.000	.	.
IONCAL (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = N/A
JAN	1.078	1.512	1.819	1.690
FEB	1.362	2.222	2.414	2.827
APR	.618	.141	1.362	.389
MAY	.224	.273	1.023	2.138
JUN	.248	.235	.367	1.127
JUL	7.361	7.153	7.565	8.112
AUG	4.939	3.353	3.686	3.162
OCT	1.145	.581	.439	.280
DEC	3.910	3.432	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

LANGELIERS INDEX (DMNSLESS)

DET'N LIMIT = N/A

GUIDELINE = N/A

JAN	.789	.794	.614	.785
FEB	.647	.437	.488	.403
APR	.864	.773	.736	.657
MAY	.642	.509	.480	.419
JUN	.561	.596	.397	.404
JUL	.449	.340	.335	.400
AUG	.289	.071	-.064	-.088
OCT	.428	.219	.158	.142
DEC	.803	.805	.	.

MAGNESIUM (MG/L)

DET'N LIMIT = 0.10

GUIDELINE = 30 (F2)

JAN	8.300	8.700	8.300	8.350
FEB	9.900	9.500	9.800	9.700
APR	9.200	9.300	9.300	9.300
MAY	9.250	9.150	8.950	9.050
JUN	10.100	10.100	10.000	10.100
JUL	10.300	10.800	10.750	10.800
AUG	10.450	10.650	10.100	10.050
OCT	10.350	10.200	10.250	10.200
DEC	8.800	9.000	.	.

SODIUM (MG/L)

DET'N LIMIT = 0.2

GUIDELINE = 200 (A4)

JAN	8.600	8.800	8.600	8.500
FEB	8.400	8.000	8.000	7.800
APR	7.800	8.200	8.400	8.200
MAY	10.500	11.600	12.100	9.900
JUN	8.400	8.800	9.400	9.000
JUL	8.000	8.700	8.600	8.100
AUG	8.900	9.000	9.000	8.900
OCT	8.400	8.500	9.700	8.900
DEC	9.400	9.400	.	.

AMMONIUM TOTAL (MG/L)

DET'N LIMIT = 0.002

GUIDELINE = 0.05 (F2)

JAN	.186	.002 <T	.028	BDL
FEB	.022	BDL	.016	BDL
APR	.016	BDL	BDL	BDL
MAY	.036	BDL	.006 <T	BDL
JUN	.002 <T	BDL	.024	.002 <T
JUL	.024	BDL	.008 <T	BDL
AUG	.034	.012	.016	.012
OCT	.034	.010	.014	.012
DEC	.018	.008 <T	.	.

NITRITE (MG/L)

DET'N LIMIT = 0.001

GUIDELINE = 1 (A1)

JAN	.010	.004 <T	.002 <T	.002 <T
FEB	.004 <T	.001 <T	.001 <T	.001 <T
APR	.023	.005	.003 <T	.001 <T
MAY	.003 <T	.002 <T	.002 <T	.001 <T
JUN	.031	.015	.019	.017
JUL	.004 <T	.001 <T	.002 <T	.002 <T
AUG	.004 <T	.002 <T	.003 <T	.002 <T
OCT	.004 <T	.001 <T	.001 <T	.001 <T
DEC	.005	.001 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)
JAN	.560	.535	.575	.560
FEB	.255	.270	.250	.250
APR	.050	.030	.040	.035
MAY	.010 <T	.055	.035	.030
JUN	.030	.055	.080	.075
JUL	.015 <T	.065	.060	.065
AUG	.045	.075	.055	.075
OCT	.035	.035	.040	.035
DEC	.265	.260	.	.
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
JAN	.660	.350	.470	.340
FEB	.410	.280	.340	.290
APR	.470	.360	.400	.320
MAY	.150	.150	.150	.160
JUN	.690	.580	.710	.610
JUL	.870	.740	.850	.910
AUG	.850	.710	.950	.860
OCT	.700	.540	.570	.540
DEC	.390	.340	.	.
PH (DMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)
JAN	8.290	8.320	8.160	8.330
FEB	8.160	8.020	8.040	7.970
APR	8.390	8.330	8.300	8.220
MAY	8.200	8.070	8.060	8.020
JUN	8.240	8.280	8.130	8.140
JUL	8.250	8.150	8.140	8.200
AUG	8.240	8.030	7.960	7.940
OCT	8.190	8.020	7.970	7.940
DEC	8.300	8.310	.	.
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A
JAN	.001 <T	.000 <T	.	.
FEB	.000 <T	BDL	.	.
APR	.002 <T	.001 <T	.	.
MAY	.001 <T	.001 <T	.	.
JUN	.004	.001 <T	.	.
JUL	BDL	.001 <T	.	.
AUG	.002 <T	.001 <T	.	.
OCT	.001 <T	.002 <T	.	.
DEC	.001 <T	.001 <T	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)
JAN	.014	.006 <T	.	.
FEB	.009 <T	.003 <T	.	.
APR	.024	.012	.	.
MAY	.002 <T	.003 <T	.	.
JUN	.022	.012	.	.
JUL	.025	.015	.	.
AUG	.019	.011	.	.
OCT	.012	.006 <T	.	.
DEC	.002 <T	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1	
			STANDING	FREE FLOW
SULPHATE (MG/L)			DET'N LIMIT = .200	GUIDELINE = 500 (A3)
JAN	14.380	22.990	22.370	22.890
FEB	15.270	24.410	25.470	25.520
APR	13.800	22.220	23.080	23.190
MAY	9.930	16.200	19.760	17.790
JUN	8.960	15.250	15.200	15.040
JUL	7.940	12.050	12.260	12.090
AUG	7.960	14.110	14.230	14.350
OCT	12.300	22.440	22.030	22.910
DEC	17.870	18.840		
TURBIDITY (FTU)			DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)
JAN	2.400	.680	1.300	.770
FEB	2.200	.690	.860	.600
APR	1.310	1.660	.750	.640
MAY	1.180	1.120	1.110	1.060
JUN	.580	.560	.570	.590
JUL	.900	1.320	.840	1.060
AUG	.760	.780	1.200	.780
OCT	.900	.720	.560	.620
DEC	2.700	.930		

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
METALS					
ALUMINUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)	
JAN	24.000	210.000	220.000	220.000	
FEB	8.400	140.000	100.000	120.000	
APR	12.000	770.000	180.000	180.000	
MAY	11.000	500.000	560.000	560.000	
JUN	4.300	280.000	220.000	230.000	
JUL	6.900	220.000	210.000	220.000	
AUG	11.000	320.000	270.000	270.000	
OCT	2.900	460.000	440.000	440.000	
DEC	18.000	70.000	.	.	
ARSENIC (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)	
JAN	.380 <T	.360 <T	.390 <T	.390 <T	
FEB	.230 <T	.260 <T	.180 <T	.220 <T	
APR	.180 <T	.120 <T	.200 <T	.130 <T	
MAY	.360 <T	.510 <T	.620 <T	.280 <T	
JUN	.330 <T	.220 <T	BDL	.170 <T	
JUL	.380 <T	.340 <T	.400 <T	.390 <T	
AUG	.350 <T	.260 <T	.380 <T	.180 <T	
OCT	.320 <T	.330 <T	.310 <T	.290 <T	
DEC	.160 <T	.220 <T	.	.	
BARIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)	
JAN	52.000	49.000	48.000	48.000	
FEB	53.000	46.000	49.000	47.000	
APR	51.000	50.000	50.000	51.000	
MAY	53.000	48.000	49.000	48.000	
JUN	56.000	52.000	51.000	51.000	
JUL	54.000	50.000	51.000	49.000	
AUG	43.000	43.000	41.000	41.000	
OCT	47.000	43.000	43.000	43.000	
DEC	55.000	55.000	.	.	
BORON (UG/L)		DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)	
JAN	34.000	35.000	39.000	22.000	
FEB	34.000	21.000	40.000	22.000	
APR	23.000	51.000	72.000	67.000	
MAY	90.000	85.000	32.000	57.000	
JUN	35.000	33.000	33.000	33.000	
JUL	39.000	37.000	45.000	39.000	
AUG	49.000	49.000	52.000	49.000	
OCT	21.000	21.000	26.000	19.000 <T	
DEC	20.000 <T	16.000 <T	.	.	
BERYLLIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 6800 (D4)	
JAN	BDL	.070 <T	BDL	BDL	
FEB	BDL	.070 <T	.060 <T	BDL	
APR	BDL	BDL	.070 <T	.070 <T	
MAY	.060 <T	.100 <T	BDL	.100 <T	
JUN	BDL	BDL	BDL	BDL	
JUL	BDL	BDL	BDL	BDL	
AUG	BDL	.060 <T	.060 <T	BDL	
OCT	BDL	BDL	BDL	BDL	
DEC	BDL	BDL	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CADMIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)
JAN	BDL	BDL	.200 <T	BDL
FEB	BDL	BDL	.100 <T	BDL
APR	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL
JUN	BDL	BDL	BDL	BDL
JUL	BDL	BDL	BDL	BDL
AUG	BDL	BDL	.090 <T	BDL
OCT	.160 <T	BDL	.080 <T	BDL
DEC	BDL	BDL	.	.
COBALT (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
JAN	BDL	.040 <T	.080 <T	.030 <T
FEB	.060 <T	.170 <T	.040 <T	BDL
APR	.090 <T	.110 <T	.120 <T	.120 <T
MAY	.160 <T	.140 <T	.200 <T	.140 <T
JUN	.140 <T	.110 <T	.220 <T	.110 <T
JUL	.160 <T	.180 <T	.220 <T	.160 <T
AUG	.040 <T	.100 <T	.070 <T	BDL
OCT	.130 <T	.100 <T	.160 <T	.090 <T
DEC	.120 <T	.130 <T	.	.
CHROMIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 50 (A1)
JAN	5.400	5.400	5.600	1.100 <T
FEB	3.200 <T	BDL	4.400 <T	BDL
APR	BDL	1.900 <T	2.600 <T	2.900 <T
MAY	3.900 <T	3.600 <T	BDL	1.800 <T
JUN	2.600 <T	2.400 <T	2.200 <T	2.300 <T
JUL	.870 <T	.750 <T	1.000 <T	.900 <T
AUG	1.300 <T	1.200 <T	1.400 <T	1.200 <T
OCT	1.200 <T	1.000 <T	1.400 <T	BDL
DEC	.780 <T	BDL	.	.
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)
JAN	.610 <T	BDL	12.000	5.500
FEB	4.000 <T	.590 <T	22.000	6.600
APR	.550 <T	BDL	14.000	6.400
MAY	.510 <T	BDL	32.000	6.100
JUN	BDL	BDL	35.000	6.300
JUL	BDL	BDL	34.000	6.700
AUG	2.900 <T	BDL	43.000	17.000
OCT	BDL	.610 <T	24.000	4.900 <T
DEC	.620 <T	.630 <T	.	.
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)
JAN	79.000	9.900 <T	14.000 <T	14.000 <T
FEB	55.000 <T	11.000 <T	68.000	10.000 <T
APR	120.000	67.000	10.000 <T	6.500 <T
MAY	72.000	31.000 <T	33.000 <T	29.000 <T
JUN	56.000 <T	19.000 <T	12.000 <T	14.000 <T
JUL	26.000 <T	13.000 <T	13.000 <T	12.000 <T
AUG	20.000 <T	7.900 <T	12.000 <T	6.900 <T
OCT	40.000 <T	19.000 <T	20.000 <T	18.000 <T
DEC	130.000	42.000 <T	.	.

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DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1	(A1)
JAN	BDL	.030 <T	.	.	
FEB	BDL	BDL	.	.	
APR	BDL	BDL	.	.	
MAY	BDL	BDL	.	.	
JUN	BDL	.330	.	.	
JUL	BDL	.150	.	.	
AUG	BDL	BDL	.	.	
OCT	BDL	.060 <T	.	.	
DEC	.050 <T	BDL	.	.	
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50	(A3)
JAN	18.000	22.000	21.000	20.000	
FEB	11.000	12.000	12.000	12.000	
APR	34.000	15.000	8.800	8.500	
MAY	27.000	8.400	6.900	6.600	
JUN	16.000	2.600	2.700	2.300	
JUL	15.000	2.500	2.500	2.200	
AUG	14.000	2.900	3.900	3.600	
OCT	9.200	1.600	1.600	1.400	
DEC	21.000	6.000	.	.	
MOLYBDENUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A	
JAN	.110 <T	.110 <T	.110 <T	.100 <T	
FEB	.100 <T	.160 <T	.090 <T	.160 <T	
APR	.210 <T	.190 <T	.150 <T	.200 <T	
MAY	.060 <T	.130 <T	.100 <T	.070 <T	
JUN	BDL	.060 <T	.070 <T	.060 <T	
JUL	BDL	BDL	BDL	BDL	
AUG	.070 <T	.070 <T	.110 <T	BDL	
OCT	.070 <T	.150 <T	.110 <T	.120 <T	
DEC	.070 <T	.140 <T	.	.	
NICKEL (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 350 (D3)	
JAN	BDL	BDL	.470 <T	BDL	
FEB	BDL	BDL	BDL	BDL	
APR	BDL	BDL	BDL	BDL	
MAY	.750 <T	BDL	1.100 <T	BDL	
JUN	BDL	BDL	.920 <T	BDL	
JUL	BDL	BDL	BDL	BDL	
AUG	BDL	BDL	1.400 <T	BDL	
OCT	.340 <T	.260 <T	1.600 <T	.240 <T	
DEC	BDL	BDL	.	.	
LEAD (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10. (A1)	
JAN	.240 <T	BDL	1.900	.520	
FEB	.420 <T	.100 <T	1.300	.700	
APR	.490 <T	.160 <T	1.800	.940	
MAY	.610	.160 <T	3.700	.870	
JUN	.780	.100 <T	2.800	.740	
JUL	.640	.060 <T	2.500	.850	
AUG	.770	.080 <T	3.600	2.700	
OCT	.400 <T	.080 <T	2.000	.970	
DEC	2.700	.150 <T	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1	
		STANDING		FREE FLOW	
ANTIMONY (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 10 (A1)	
JAN	.310 <T	.390 <T	.270 <T	.280 <T	
FEB	.420 <T	.760	.490 <T	.380 <T	
APR	.380 <T	.400 <T	.430 <T	.370 <T	
MAY	.410 <T	.480 <T	.460 <T	.340 <T	
JUN	.330 <T	.440 <T	.420 <T	.350 <T	
JUL	.370 <T	.460 <T	.390 <T	.370 <T	
AUG	.350 <T	.510	.330 <T	.310 <T	
OCT	.390 <T	.500 <T	.470 <T	.340 <T	
DEC	.500 <T	.480 <T	.	.	
SELENIUM (UG/L)		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)	
JAN	BDL	BDL	BDL	BDL	
FEB	BDL	BDL	1.800 <T	1.900 <T	
APR	BDL	1.500 <T	1.900 <T	BDL	
MAY	BDL	1.500 <T	BDL	BDL	
JUN	BDL	BDL	BDL	1.200 <T	
JUL	BDL	BDL	BDL	BDL	
AUG	BDL	BDL	BDL	BDL	
OCT	BDL	BDL	BDL	BDL	
DEC	BDL	1.100 <T	.	.	
STRONTIUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = N/A	
JAN	1100.000	1100.000	1100.000	1000.000	
FEB	1000.000	1000.000	1100.000	1100.000	
APR	1100.000	1100.000	1100.000	1100.000	
MAY	920.000	850.000	860.000	860.000	
JUN	1100.000	1100.000	1100.000	1000.000	
JUL	1000.000	1000.000	1000.000	1000.000	
AUG	960.000	1000.000	950.000	930.000	
OCT	970.000	940.000	970.000	970.000	
DEC	1100.000	1100.000	.	.	
TITANIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = N/A	
JAN	8.000	6.700	6.600	5.300	
FEB	7.300	7.200	3.400 <T	3.600 <T	
APR	18.000	13.000	11.000	12.000	
MAY	9.300	9.500	9.400	10.000	
JUN	17.000	15.000	15.000	15.000	
JUL	8.300	8.400	8.500	8.600	
AUG	17.000	16.000	16.000	14.000	
OCT	2.900 <T	2.800 <T	3.500 <T	3.200 <T	
DEC	4.600 <T	3.600 <T	.	.	
URANIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 100 (A1)	
JAN	.140 <T	.100 <T	.090 <T	.080 <T	
FEB	.140 <T	.100 <T	.120 <T	.100 <T	
APR	.120 <T	.130 <T	.130 <T	.150 <T	
MAY	.090 <T	.090 <T	.090 <T	.080 <T	
JUN	BDL	BDL	BDL	BDL	
JUL	BDL	BDL	BDL	BDL	
AUG	BDL	BDL	BDL	BDL	
OCT	BDL	.060 <T	.060 <T	BDL	
DEC	.090 <T	.100 <T	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

VANADIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = N/A
JAN	.340 <T	.320 <T	.310 <T	.320 <T
FEB	.210 <T	.210 <T	.160 <T	.200 <T
APR	.280 <T	.270 <T	.250 <T	.190 <T
MAY	.290 <T	.380 <T	.370 <T	.350 <T
JUN	.300 <T	.290 <T	.330 <T	.330 <T
JUL	.400 <T	.340 <T	.440 <T	.410 <T
AUG	.360 <T	.360 <T	.380 <T	.410 <T
OCT	.250 <T	.230 <T	.240 <T	.230 <T
DEC	.100 <T	BDL	.	.
ZINC (UG/L)		DET'N LIMIT = 0.20		GUIDELINE = 5000 (A3)
JAN	1.800 <T	3.700	41.000	3.100
FEB	2.400	2.800	7.300	3.100
APR	2.200	2.200	10.000	2.700
MAY	1.300 <T	4.600	11.000	2.500
JUN	1.400 <T	2.900	14.000	2.400
JUL	1.200 <T	2.400	14.000	2.600
AUG	.630 <T	1.000 <T	15.000	4.900
OCT	1.800 <T	5.500	16.000	5.900
DEC	1.400 <T	2.000 <T	.	.

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DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CHLOROAROMATICS				
HEXACHLOROCYCLOPENTADIENE (NG/L)			DET'N LIMIT = 5.000	GUIDELINE = 206000 (D4)
OCT	BDL	100.000	.	50.000 <T
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1	
			STANDING	FREE FLOW
CHLOROPHENOLS				
246-TRICHLOROPHENOL (NG/L)			DET'N LIMIT = 20.0	GUIDELINE = 5000 (A1)
MAY	BDL	80.000 <T	.	.
OCT	BDL	170.000 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

PESTICIDES & PCB			
ALPHA BHC (NG/L)		DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
JAN	1.000 <T	BDL	BDL
FEB	BDL	BDL	BDL
APR	BDL	BDL	BDL
MAY	BDL	BDL	BDL
JUN	BDL	BDL	BDL
JUL	BDL	BDL	1.000 <T
AUG	BDL	BDL	BDL
OCT	1.000 <T	BDL	BDL
DEC	BDL	BDL	.
ATRAZINE (NG/L)			
		DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
JAN	BDL	BDL	.
FEB	BDL	BDL	.
APR	BDL	BDL	.
MAY	150.000 <T	BDL	.
JUN	BDL	!LA	.
JUL	BDL	BDL	.
AUG	BDL	BDL	.
OCT	BDL	BDL	.
DEC	BDL	BDL	.

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WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

PHENOLICS		PHENOLICS		DET'N LIMIT = .200	GUIDELINE = 2 (A4)
PHENOLICS (UG/L	)				
JAN	2.800	1.800	.	.	.
FEB	.800 <T	.600 <T	.	.	.
APR	.600 <T	.600 <T	.	.	.
MAY	.400 <T	.400 <T	.	.	.
JUN	BDL	BDL	.	.	.
JUL	BDL	BDL	.	.	.
AUG	BDL	BDL	.	.	.
OCT	BDL	.400 <T	.	.	.
DEC	1.000	1.000	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

VOLATILES			
BENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
JAN	BDL	BDL	BDL
FEB	BDL	.	.050 <T
APR	BDL	.	BDL
MAY	BDL	.	BDL
JUN	BDL	.	BDL
JUL	BDL	.	BDL
AUG	BDL	.	BDL
OCT	BDL	.	BDL
DEC	BDL	.	.
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
JAN	BDL	BDL	BDL
FEB	.100 <T	.050 <T	.100 <T
APR	.100 <T	.050 <T	BDL
MAY	BDL	.050 <T	.050 <T
JUN	BDL	.150 <T	BDL
JUL	BDL	BDL	BDL
AUG	BDL	BDL	BDL
OCT	BDL	BDL	BDL
DEC	BDL	BDL	.
STYRENE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
JAN	BDL	.050 <T	BDL
FEB	.100 <T	.150 <T	.150 <T
APR	.100 <T	.100 <T	.050 <T
MAY	BDL	.150 <T	.100 <T
JUN	BDL	.300 <T	.100 <T
JUL	BDL	BDL	BDL
AUG	BDL	BDL	BDL
OCT	BDL	BDL	BDL
DEC	BDL	.050 <T	.
CHLOROFORM (UG/L)		DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
JAN	BDL	40.600	47.000
FEB	BDL	56.600	60.600
APR	BDL	88.700	78.500
MAY	BDL	100.800	99.000
JUN	BDL	119.000	124.700
JUL	.100 <T	163.200	155.900
AUG	.300 <T	138.500	136.800
OCT	.200 <T	109.400	96.700
DEC	BDL	84.100	.
DICHLOROBROMOMETHANE (UG/L)		DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
JAN	BDL	10.300	10.850
FEB	BDL	10.000	10.800
APR	BDL	10.550	11.250
MAY	BDL	12.500	10.800
JUN	BDL	13.700	14.900
JUL	BDL	20.100	19.400
AUG	BDL	22.050	22.550
OCT	BDL	15.400	14.000
DEC	BDL	12.950	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM ODESSA WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

STANDING

FREE FLOW

CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
JAN	BDL	1.100	.	1.000
FEB	BDL	.700 <T	.	.800 <T
APR	BDL	.500 <T	.	.700 <T
MAY	BDL	.700 <T	.	.600 <T
JUN	BDL	.700 <T	.	.800 <T
JUL	BDL	1.000 <T	.	1.000 <T
AUG	BDL	1.400	.	1.500
OCT	BDL	.700 <T	.	.600 <T
DEC	BDL	.600 <T	.	.
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)
JAN	BDL	BDL	.	BDL
FEB	BDL	BDL	.	BDL
APR	BDL	BDL	.	BDL
MAY	BDL	BDL	.	BDL
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
AUG	BDL	BDL	.	.050 <T
OCT	BDL	BDL	.	BDL
DEC	BDL	BDL	.	.
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
JAN	BDL	51.900	.	58.900
FEB	BDL	67.250	.	72.200
APR	BDL	99.750	.	90.500
MAY	BDL	114.000	.	110.350
JUN	BDL	133.350	.	140.400
JUL	BDL	184.300	.	176.300
AUG	BDL	161.900	.	160.900
OCT	BDL	125.400	.	111.350
DEC	BDL	97.600	.	.

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEx)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLOROPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedance,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program. .

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCOD0 UNIT: $\mu\text{g/L}$

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	$\mu\text{g/L}$	AL
CDWG C	87/01			5.000	$\mu\text{g/L}$	MAC
EPA C	87/07			5.000	$\mu\text{g/L}$	MCL
EPAA C	80/11			6.600	$\mu\text{g/L}$	AMBIENT **
FERC C	84/05			1.000	$\mu\text{g/L}$	MCL
WHO C	84/01			10.000	$\mu\text{g/L}$	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCOD0) 0.05 $\mu\text{g/L}$

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).
THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).

ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE. CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.

MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12

MELTING POINT: 5.5°C (27).

BOILING POINT: 80.1°C (27).

SPECIFIC GRAVITY: 0.8790 AT 20°C (27).

VAPOUR PRESSURE: 100 MM AT 26.1°C (27).

HENRY'S LAW CONSTANT: 0.00555 ATM-M³/MOLE (41).

LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).

CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41) SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 220 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Volatiles (duplicates) (OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact with sample)
- do not rinse bottle
- fill bottle completely without bubbles

Organics (OWOC), (OWTRI), (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top
- when 'special pesticides' are requested three extra bottles must be filled

Cyanide

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops sodium hydroxide (NaOH)
(Caution: NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
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Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 250 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.

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